AIP | Review of Scientific Instruments

Physics in National Planning

Karl T. Compton

Citation: Review of Scientific Instruments **5**, 235 (1934); doi: 10.1063/1.1751837
View online: http://dx.doi.org/10.1063/1.1751837
View Table of Contents: http://scitation.aip.org/content/aip/journal/rsi/5/7?ver=pdfcov
Published by the AIP Publishing

PHYSICS FORUM

Physics in National Planning

IT is assumed that the objectives of national planning are, broadly speaking, the material, intellectual and spiritual welfare of the people. More specifically, it aims at general and steady employment of desirable types and with adequate remuneration, at efficient utilization and conservation of natural resources, at the use of leisure time in ways which will be beneficial both individually and socially and at a wise balance between individual opportunity on the one hand and proper social control on the other. Toward these objectives the science of physics should contribute directly or indirectly in a fundamental way.

This statement is justified by a long record of past experience. Historically we note that the science of physics has given birth to nearly all of those ideas, processes and agencies which have brought man to an understanding of the material universe and to the use of its forces for his own purposes. Physics has produced civil engineering, mechanical engineering, electrical engineering, a large part of chemical engineering, modern metallurgy, electrical communications, refrigeration, heating, ventilating, automotive and aeronautical engineering—and the countless products of those arts which have revolutionized modern life, not only in its material aspects but also in its intellectual, economic and social relationships. Physics has not only originated these things but it continues to develop them.

The basic importance of physics in national planning lies in the fact that there is every reason to expect a continuation of this process of discovery of new ideas, development of new processes, control of new forces.

It may be anticipated that physics will develop new sources of energy for commercial use. It is just now bringing in a new era in the production of materials of construction, such as metals with special properties. It is creating a new electrical art through the development of electronic devices for conversion of power and automatic control of machinery. It is greatly extending our knowledge of meteorology, oceanography and geology, economically as well as scientifically. It is finding constantly extended applications in medicine. It has created a new chemistry, and many believe that it is on the verge of creating a new biology. Of all the sciences, it is now developing at relatively the most rapid pace. Its consideration in national planning is due to the potential power of the developments along these lines, which will come.

How can physics be dealt with in a scheme of national planning? Simply thus: its development may be hindered or accelerated. If accelerated, this may be done somewhat selectively, as may be desired. Let us discuss these possibilities.

1. The development of physics may purposely be hindered, as by reduction of funds for research or by anti-educational propaganda. Some people suspect that this should be done in order to allow some other aspects of life to catch up to a state of equilibrium. But there are objections to such a negative policy. For example, it would surely create, in the future, an unemployment crisis which might very possibly wreck us completely. We can visualize this by considering where and when an unemployment crisis would have struck us if the development of the electrical and automotive industries, for example, had been retarded seriously during the past half century. Similarly, if we now retard scientific development, the next generation will pay a heavy penalty through economic distress and loss of opportunity.

Furthermore, if we curtail the progress of physics, we will rapidly put ourselves at the economic mercy of less short-sighted nations.

No amount of political or economic maneuvering can offset or combat successfully the natural results of a great invention or engineering development.

2. The development of physics may purposely be accelerated, selectively if desired. An example of this has been the marked growth of mathematical physics in this country as the result of a policy of the National Research Fellowship Board to favor this field, for a time, in order to overcome America's initial deficiency in this field. Funds and encouragement, properly directed, will accomplish the purpose. The results, as regards economic advantage, will be the opposite of those in the preceding paragraph.

It is submitted that our National Government has shown lamentable lack of vision in its failure to build for the future, through science, more effectively. It spends only half of one percent of its budget on all of its scientific bureaus combined. It has recently appropriated $3,000,000,000 for construction of public works with no legal provision for support of any research, not even on the construction itself in order to improve future construction! It spends on one battleship a sum which, if devoted to scientific research under proper auspices, would have reasonable chance of creating new industries or controlling deadly diseases. In respect to future benefits to be reasonably expected from expenditures for scientific research, Federal policy has been more like that of a fly-by-night promotion enterprise than of a stable enduring business, building for its future.

Passing, finally, from the consideration of physics in the general welfare of the people to the more restricted consideration of physics as a part of the operating program of the government, we have a relatively clear-cut picture, which may be considered briefly in the following bureaucratic divisions:

The work of the National Bureau of Standards is predominantly physics, pure and applied. It is essential to the successful operation of laboratories and manufacturing processes throughout the country. In recent economies this bureau's budget has been cut about forty-five percent. However, the calls on it to test materials purchased by other government departments (for which it is not reimbursed and which work was not contemplated in the Organic Act which created the Bureau) absorb such a large portion of its remaining funds that the funds for the fundamental work of the Bureau are effectively cut to thirty percent of their 1932 figure. It is highly important that this should be increased.

The Army and Navy have recently submitted lists of technical problems needing solution for these services. A majority of these lie within the field of physics. The late war was a striking example of what physics can accomplish in the way of meeting new problems once the attention of physicists is enlisted.

The outstanding technical problems before the aviation services are primarily in physics. They include fog dissipation, blind landing, development of navigating instruments, engine cooling, better plane design.

In the Hydrographic Office, Coast and Geodetic Survey, Geological Survey and Bureau of Mines there are various new applications of physics which are so successful as to suggest further opportunities along similar lines.

In the Department of Agriculture physics has played an important role in the development and study of the process of nitrogen fixation and at present is active in the field of light absorption by chlorophyl and related topics. It is perhaps no exaggeration to say that the action of light on plant growth is the most important physicochemical reaction in the world.

Important problems before the Tennessee Valley Authority come within the scope of the physicist and are now being tackled by physicists. The same thing is true in the big projects before the Bureau of Reclamation. In general, new problems outside the customary engineering routine call for joint attack by the engineer and the physicist.

The Science Advisory Board has, through special committees, been cooperating with a number of governmental scientific bureaus to assist in the development of well considered programs for future development. More important than these special problems, however, is the fundamental question of the place of science in national planning and the question as to what can be the most beneficial national policy on scientific work.

KARL T. COMPTON